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MAY 7, 1949

SCIENCE NEWS LETTER

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DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Coal-to-Oil

See page 293

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VOL. 55, NO. 19

What happens when you hear? What happens *inside* your ear when sound waves come in from a telephone conversation?

Bell Telephone Laboratories scientists have developed special apparatus to help answer these questions, for the telephone system is designed to meet the ear's requirements for good listening.

In the test pictured above, the young lady sits before loudspeakers in a soundproofed room with a small hollow tube, reaching just inside the ear canal. Sounds differing slightly in frequency and intensity come from a loudspeaker. The subject seeks to tell one from another, recording her judgment electrically by pressing a switch.

Meanwhile, the same sound waves pass down the hollow tube to a condenser microphone, and a record is made of the exact sound intensities she identified. Results help reveal the sound levels you can hear clearly and without strain — the sounds your telephone must be designed to carry.

Scientists at Bell Telephone Laboratories make hundreds of tests in this manner. It's just one part of the work which goes on year after year at the Laboratories to help keep Bell System telephone service the finest on earth.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting, for continued improvements and economies in telephone service.

MEDICINE

War Gases Aid Transfusion

Nitrogen mustard may be used in the future to sterilize blood so that patients will not be exposed to the danger of jaundice from the blood of diseased donors.

➤NITROGEN mustard war gases may in future be used to make blood plasma transfusions safer. They will do it because of their power to destroy the virus which causes jaundice in from four to 10 of every 100 persons getting transfusions of pooled plasma.

The possibility of using nitrogen mustards for this purpose was discovered by Drs. Frank W. Hartman, George H. Mangun, Norma Freeley and Edna Jackson of the Henry Ford Hospital in Detroit.

Pooled plasma is the plasma that comes from the blood of many donors. During the war it was used extensively for the wounded. When methods of preserving whole blood were developed so that this could be transported overseas, this was used in many cases instead of plasma. But civilian hospital blood banks still kept and used the plasma after the whole blood became too old for transfusion. If some of the donors contributing blood to the banks had the jaundice virus in their blood, without knowing it, the virus would get into the blood and plasma in the banks. This happened often enough to become a serious problem in the use of the pooled plasma.

Irradiating the blood with ultraviolet light, X-rays or high speed electrons has offered promise of solution of this problem. But the techniques require highly specialized equipment which means the plasma can be sterilized this way only at specially equipped plants.

The Detroit scientists therefore undertook a search for a chemical that would sterilize the blood without damaging it and without itself causing damage to humans who would get the blood or plasma. They have apparently found such a chemical in the nitrogen mustard known as HN2.

This chemical kills both viruses and bacteria in whole blood, blood plasma and blood serum, they reported in the PROCEEDINGS OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE (Feb.) It does not cause any major change in either the plasma or the red blood cells, so these will still be effective in transfusions.

Plasma sterilized with the nitrogen mustard has been given to two humans and two dogs. No sign of poisoning or of sensitization was seen in any of them.

If the acidity of the citrated blood is adjusted by adding calcium chloride, the poisonous effect of the nitrogen mustard is destroyed.

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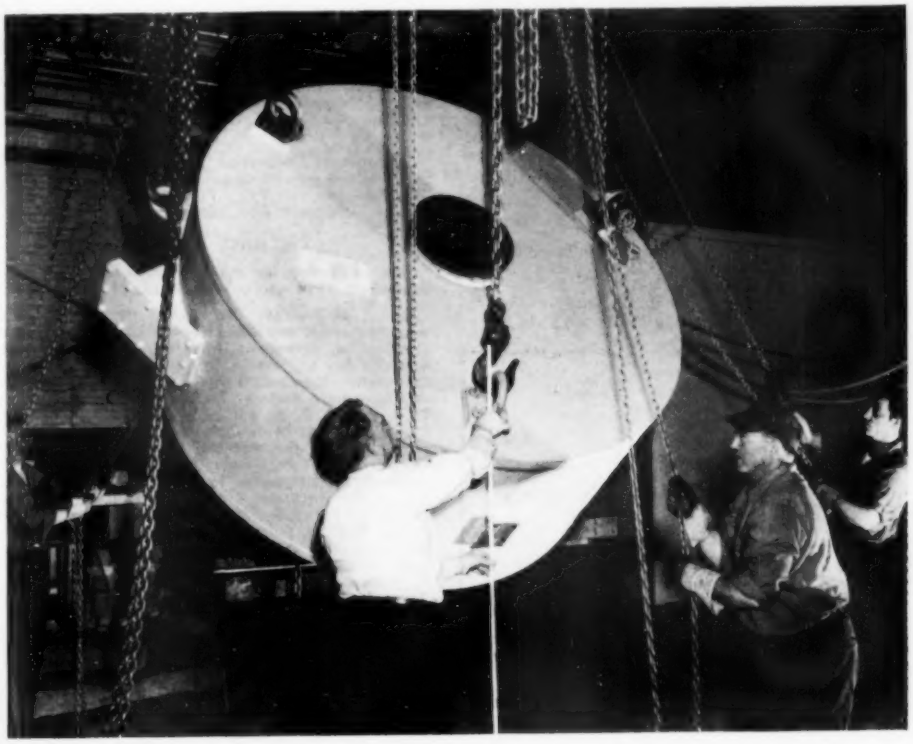

CHAMBER FOR ATOM-SMASHING—This steel tank houses the accelerating chamber of the 300,000,000-electron volt synchrotron being built in the General Electric Research laboratory.

BIOLOGY

Genes First, Cells Second, Sex Third in Evolution

➤ FREE-LIVING genes, able to propagate themselves and subject to mutational change, were first living things to undergo evolution. Later, genes became aggregated into cells, with chromosomal structures. Finally, cells combined or mated, originating sex.

This was the picture of the probable first events in the development of life on this planet presented before the meeting of the American Philosophical Society in Philadelphia by Prof. Sewall Wright of the University of Chicago.

Most important of the three steps, in terms of rapidity of evolutionary change, was the development of sex, with the splitting of sets of genes on chromosomes and their re-combination with other chromosomes bearing genes which often had different mutational histories. By this step, "the interbreeding population becomes the major entity that evolves," the speaker explained. "The field of variability is vastly amplified by recombination. The origin of multicellular beings may be considered a fourth major step because of the greater material scope which it offers but the system of evolutionary factors is not increased."

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NUCLEAR PHYSICS

New Type Atom-Smashing Synchrotron Being Built

➤ A NEW kind of atom-smashing synchrotron which is under construction in Schenectady, N. Y., may be able to produce billion-volt X-rays.

The non-ferro-magnetic synchrotron is being built at the General Electric Research Laboratory where it will be used for nuclear studies. Dr. James L. Lawson is in charge of the design and construction of the machine which is being built under a contract with the Office of Naval Research.

Listed as a 300,000,000-electron-volt instrument, the new atom smasher may ultimately produce 1,000,000,000 electron volts, GE officials said.

Instead of using a laminated steel electromagnet, the new non-ferro-magnetic synchrotron will produce magnetic fields with several sets of coils through which current will flow.

Science News Letter, May 7, 1949

GENERAL SCIENCE

Societies Elect Members

➤ DISTINGUISHED American and foreign scientists have been added to the membership of two of America's most exclusive science societies, the National Academy of Sciences, and the American Philosophical Society.

Dr. Edwin Bidwell Wilson, emeritus professor of vital statistics at the Harvard School of Public Health, was elected vice president of the Academy for the next four years, beginning July 1. Other officers of the Academy are: Dr. Alfred N. Richards, president; Dr. Detlev W. Bronk, foreign secretary; Dr. Fred E. Wright, home secretary; and Dr. William J. Robbins, treasurer.

Elected to the Council of the Academy for a three-year term are: Dr. Joel H. Hildebrand, professor of chemistry, University of California; and Dr. Ernest W. Goodpasture, professor of pathology and Dean, School of Medicine, Vanderbilt University.

The following new members were elected to the Academy:

George W. Bartelmez, professor of anatomy, University of Chicago; Frank A. Beach, professor of psychology, Yale University; Robert B. Brode, professor of physics, University of California; Paul R. Burkholder, Eaton professor of botany, Yale University; Lowell T. Coggeshall, professor and chairman, department of medicine, and dean, division of biological sciences, University of Chicago; Max Delbruck, professor of biophysics, California Institute of Technology; Robert C. Elderfield, professor of chemistry, Columbia University; William F. Gibbs, vice president, Gibbs and Cox; William W. Hansen, professor of physics, Stanford University; Charles B. Huggins, professor of surgery, University of Chicago; Walter D. Lambert, U. S. Coast and Geodetic Survey (Retired); Howard B. Lewis, professor and head of department of physiological chemistry, University of Michigan; Francis W. Loomis, professor and head of department of physics University of Illinois; Thomas S. Lovering, U. S. Geological Survey; Samuel M. McElvain, professor of chemistry, University of Wisconsin; Saunders MacLane, professor of mathematics, University of Chicago; Nicholas U. Mayall, Lick Observatory; Otto Meyerhof, research professor of physiological chemistry, University of Pennsylvania; John S. Nicholas, Sterling professor of biology, Yale University; George B. Pegram, professor of physics and dean of graduate faculties, Columbia University; Kenneth S. Pitzer, professor of chemistry, University of California; Kenneth B. Raper, senior microbiologist, Northern Regional Research Laboratory, U. S. Department of Agriculture; John L. Savage, chief designer, U. S. Bureau of Reclamation; Carl F. Schmidt, professor of pharmacology, University of Pennsylvania; Julian Schwinger, professor of physics, Harvard University; Harry L. Shapiro, professor of anthropology, Columbia University; Oliver R. Wulf, professor, division of chemistry and chemical engineering, California Institute of Technology; Ralph W. G. Wyckoff, scientist director, National Institute of Health; Frederick W. H. Zachariasen, professor and chairman of the department of physics, University of Chicago.

New foreign associates elected are:

Élie Cartan, professor of geometry, University of Paris, Paris, France; Paul A. M. Dirac, Lucasian professor of mathematical physics, St. John's College, Cambridge, England; Bernard Lyot, astronomer, Meudon Observatory, Seine-et-Oise, France; Henri Piéron, director, laboratory of physiological psychology, The Sorbonne, Paris, France; Arne Tiselius, professor of biochemistry, University of Upsala, Sweden; Øivind Winge, director, department of physiology, Carlsberg Laboratory, Copenhagen (Valby), Denmark; Hideki Yukawa, department of physics, Kyoto University, Japan.

Other scientists elected new members of the American Philosophical Society include:

Edwin Joseph Cohn, professor of biological chemistry, Harvard University; Edward Uhler Condon, physicist, National Bureau of Standards; William Vermillion Houston, physicist, Rice Institute; Saunders MacLane, mathematician, University of Chicago; Max Felix Theodor von Laue, physicist, Göttingen, Germany; John Farquhar Fulton, physiologist, Yale University; Glenn Lowell Jepsen, geologist, Princeton University; Cyril Norman Hugh Long, biochemist, Yale University and Burrhus Frederic Skinner, psychologist, Indiana University.

Dr. Edwin G. Conklin of Princeton was re-elected president of the American Philosophical Society.

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Question Box

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ENGINEERING

Liquid Fuels from Coal

We can be made self-sufficient for centuries by converting domestic coal, of which there is an ample supply, to oil.

See Front Cover

➤ LIQUID FUELS from coal, for automobiles, airplanes, powerplants and heating, can meet American needs for centuries, the nation was assured by Dr. W. C. Schroeder, chief of the Office of Synthetic Liquid Fuels of the U. S. Bureau of Mines. They will be made from domestic coal, of which the United States has ample supply, and will make the country self-sufficient in this respect whatever the future holds.

Dr. Schroeder discussed synthetic liquid fuel production in St. Louis as a guest of Watson Davis, director of Science Service, Washington, D. C., on Adventures in Science, heard over the Columbia network. Dr. Schroeder is en route to Louisiana, Mo., to the dedication of the new government Coal-to-Oil Demonstration plants. The train on which he and party will travel the 90 miles between St. Louis and Louisiana will have a diesel engine powered with synthetic oil produced at the new plant. This makes railroad history. Diesel locomotives are plentiful, but this is the first to operate on synthetic oil.

The new coal-to-oil plants at Louisiana can produce a full range of liquid products from coal, he said. First of their kind in this country, they can make aviation gasoline, motor gasoline, diesel oil, heating oil and fuel oil—all from coal. These products can be used in present-day motor cars, airplanes, tractors, oil burners, and all other such equipment without change or modification of the equipment itself. In addition, these plants will produce phenol, alcohol, and other valuable byproducts.

Two plants to produce liquid fuels from coal are to be used at Louisiana. They will demonstrate for private industry the respective merits of two basic processes for converting American coal to oil. These are the so-called hydrogenation process and the gas synthesis process.

These two processes are complementary rather than competitive, he stated, and each is best adapted to produce different products. For example, the hydrogenation process excels in the production of high-octane aviation gasoline and heavy fuel oils, whereas the gas synthesis process is the better of the two if motor gasoline is desired. One of these demonstration plants is now in use; the other will be before the end of the year.

The hydrogenation demonstration plant is shown on this week's cover of SCIENCE NEWS LETTER, with stalls of heavy reinforced concrete enclosing on three sides the giant chrome steel converter vessels in which coal is transformed into oil. These compartments are for the protection of operators in the event of fire or explosion.

Getting demonstration plants in operation is only the beginning of the job, he continued. A vast fund of information now must be collected from plant operations and from the laboratories of the oil and coal industries for the sound engineering of the very much larger commercial plants.

Then, before we can have synthetic oil and gasoline for furnaces and cars, these commercial plants must be built. Legislation has been introduced in Congress to encourage private industry to build the initial commercial-scale plants. After the construction of these initial plants, we can depend upon our great petroleum, coal and engineering industries to develop the new enterprise without using taxpayers' dollars, Dr. Schroeder concluded.

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PHYSICS

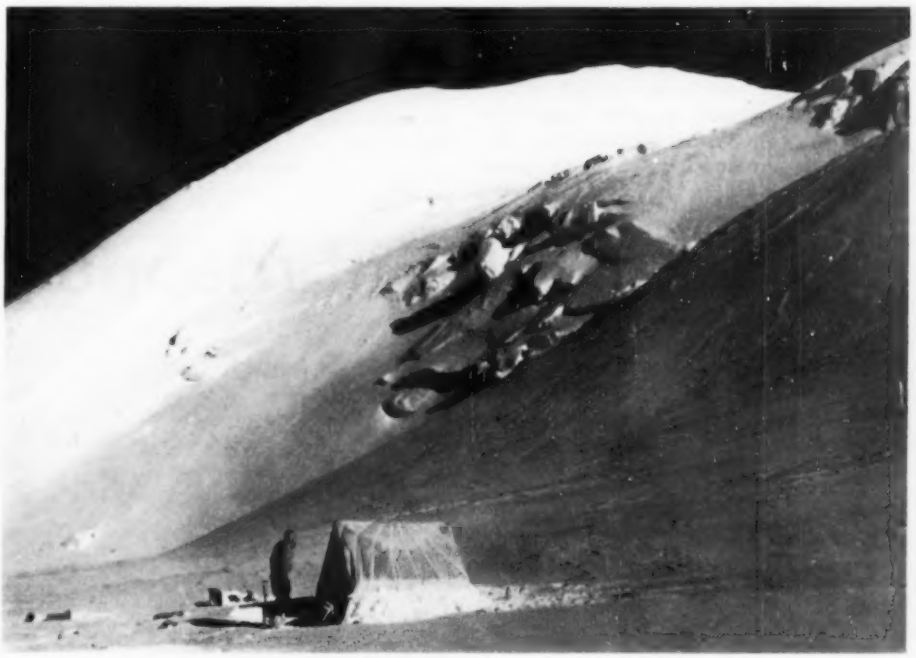
Soft X-Rays from the Sun

➤ DISCOVERY of X-rays in the upper reaches of the atmosphere probed by high-flying V-2 rockets was reported to the American Physical Society in Washington by a team of scientists from the Naval Research Laboratory.

Believed to come from the sun, these soft X-rays, actually gentler than those used by a dentist, are responsible for the ionosphere or electrified air layers in the atmosphere that reflect the radio waves and enable them to travel long distances.

Extremely short wavelength ultraviolet radiation was also detected by the rocket flights of last Nov. 18 and Feb. 17 from White Sands, N. Mex. These radiations, shorter than 1300 Angstrom units, are stopped by ordinary air and have been observed heretofore on earth only when they were generated in a vacuum.

Theories have hitherto credited the sun with giving forth radiations like those now observed to cause the radio-reflecting layers but they have never been discovered before.



HIGHEST LABORATORY?—To study the cosmic rays which bombard the earth from outer space, University of Chicago scientists parachuted equipment to a saddle of Mount McKinley in Alaska and climbed up to their new base, 18,000 feet above sea level. The Chicago physicists, Albert B. Weaver and Marcel Schein, may hold the honor of having set up the world's highest land-based laboratory. Other, more permanent high altitude laboratories are at Morococha, Peru (14,900 feet) and Mount Evans, Colo. (14,156 feet).

The scientists who did the research are Dr. T. R. Burnight, J. D. Purcell, Dr. R. Tousey, and Dr. K. Watanake, all with the Naval Research Laboratory, Anacostia, D. C.

In one set of experiments X-rays were detected by their effect upon photographic films covered by thin aluminum and beryllium windows. The ultraviolet radiation was demonstrated by exposing to the sun's radiation a phosphor strip that gave off light when heated after return to earth, thus demonstrating the presence of the invisible radiation from the sun at the high altitudes.

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ASTRONOMY

Stars Planetary Parents?

➤ PAIRS of yellowish lemon-shaped stars which waltz through space may be the ancestors from which come planetary systems such as the one in which our earth is located.

How one type of double star might be the parents of planetary systems like our own was suggested to the meeting of the National Academy of Sciences in Washington by Dr. Otto Struve of the University of Chicago's Yerkes Observatory, Williams Bay, Wis.

These yellowish double stars are called W Ursae Majoris eclipsing binaries, with the stars eclipsing one another as they move through space.

Discovery that these pairs of stars have a common envelope of gas about them has led to Dr. Struve's new theory. This gaseous envelope around the double stars is not symmetrical, varying in thickness and other properties. This indicates, the Yerkes astronomer said, that these pairs are not stable. They may either be moving apart to form more widely separated stars, or they may be moving together into a single star.

Dr. Struve's theory proposes that these yellowish, closely-mated double stars may have come from bluish, more widely spaced double stars, known as Beta Lyrae or U Cephei. This may come from the loss of streams of gases by the bluish stars. The streams are estimated to carry off a weight equal to not less than one hundred-millionth of the sun's mass each year. In addition, the streams also are believed to slow down the bluish stars.

Thus, the bluish double stars may be moving closer together, forming the yellowish star pairs. If the process continues, then the yellowish double stars may be moving together to form a single star.

The single star, resulting from the evolutionary process of this theory, might be like our sun, with planets such as the earth formed from the mass carried off by the streams from the stars.

The eclipsing double stars from which planetary systems may be formed are both slightly smaller than our own sun, but one weighs about as much as the sun and the other is only about half as heavy.

Dr. Harlow Shapley, director of the Harvard College Observatory, has discovered that this type of eclipsing double star, W Ursae Majoris, is more numerous in the heavens than all other types of eclipsing star pairs.

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PSYCHOLOGY

Eye's Index Point Mapped

➤ THE center of your eye has an index point that is to your eye what the sensitive tip of your forefinger is to your hand. Your most exact and finest seeing is done with this index area in the center of the eye's fovea.

Although this important center in the eye has been known to scientists since Clerk Maxwell first discovered it in 1856, it has now been mapped for the first time, Prof. Walter R. Miles, of the Yale School of Medicine reported to the National Academy of Sciences in Washington.

At the back of the eye in the center of a yellow pigmented section is a little depression which contains an area known as the fovea. At the center of the fovea, Prof. Miles located the index area, known to scientists as the visual fixation disk. When mapped out on charts by means of tests upon 20 men, using color filters, three concentric circles or ovals appeared. The visual fixation disk is a tiny, but well defined core, occupying four and one-half per cent of the entire area of the fovea.

The outer border of the disk is well-defined, contrasting markedly with the area outside it. The edge is about as sharp, Prof. Miles reported, as the edges of typed letters on a good carbon copy.

When you want to do any precise seeing you turn your eye so that this portion of the retina is turned directly on what you want to distinguish, such as the marking of a slide rule or the eye of a needle you are trying to thread.

The size of the disk, if it were projected onto a printed page held 14 inches from the eye, would be about the size of the capital letter "M". At workbench distance of 28.6 inches, the disk would cover an object a quarter-inch across. At floor distance of 57.3 inches, the projected disk would be a half-inch in diameter. When looking across a typical street 100 feet wide, it would measure nine inches.

The total retina, or light-sensitive back of the eye, is a semi-circle about 180 degrees from end to end. The visual fixation disk occupies only one-half of one degree of this semi-circle. This tiny part of the fovea contains from 1,200 to 2,000 cones, which are the bright light and color detectors for the eye. The cones in this area are longer and thinner than they are elsewhere and this difference helps to explain the importance of the area for sharp seeing.

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METEOROLOGY

Thunderstorms Are Made Up of Distinct "Cells"

➤ THUNDERSTORMS are made up of distinct units or "cells", each acting more or less independently of the others, Dr. Horace R. Byers of the University of Chicago told the National Academy of Sciences in Washington.

Each cell consists of a system of vertical air currents set up by marked temperature differences between ground level and higher altitudes.

Each cell goes through a three-stage life cycle, Dr. Byers explained: first the cumulus or fleecy-cloud stage, then the "mature" stage during which the air currents flow towards the earth and rain falls, and finally the dissipating stage during which the storm dies out.

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RADIO-MEDICINE

Cancer Under Microscope On Regular TV Channel

➤ TELEVISION fans of the nation's capital have now seen for themselves the differences between cancer cells and healthy, normal cells of the human body. They were able to do this through the twin eyes of the television camera and the microscope in a program sponsored by the U. S. National Cancer Institute and the American Cancer Society over WMAL-TV.

Slides with tissue-paper-thin slices of normal and cancer tissues were first focussed under the microscope. Then the huge television camera was swung over and down onto the microscope eyepiece. As the televiewers looked, they heard Dr. William Ober, research fellow at the National Cancer Institute, point out the orderly arrangement and shape and small nuclei of the normal cells and compare these to the irregularly arranged and sized cancer cells with their larger nuclei. These differences, he explained, are what help the pathologist diagnose cancer.

The program is the first in which microscopic scenes have been televised over a regular television channel.

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MEDICINE

New Light Shed on Ills

Study of ferritin, a body chemical, has revealed the important role it plays in the regulation of blood flow to body tissues under conditions such as shock.

➤ NEW light has been thrown on the basic mechanisms of such diseases as high blood pressure, cirrhosis, circulatory shock and heart failure.

The important role played in the regulation of blood flow to the tissues in the body by a substance called ferritin has been investigated by Drs. Abraham Mazur and Ephraim Shorr of the Cornell University College of Medicine. They reported their findings at the meeting of the Federation of American Societies for Experimental Biology in Detroit.

Ferritin is a protein containing iron. It is somewhat similar chemically to hemoglobin. Previously known to serve as a storage reservoir for iron for the regeneration of red blood cells, ferritin has important effects on blood vessels.

The substance is released by the liver into the blood under conditions of oxygen shortage, such as occur in shock from blood loss or injury to tissues. And in heart failure it has the effect of relaxing the muscular vessels in the capillaries.

Together with another substance formed by the kidney, also under conditions of oxygen lack and with opposite effect on the capillary blood vessels, it appears to act as an important mechanism for the regulation of circulation to the tissues. This was shown through a series of tests on experimental animals. A variety of disturbances of the circulation, such as circulatory shock, high blood pressure, heart failure and cirrhosis of the liver bring about the action of these two substances.

Ferritin also has been shown to reduce urine flow when given intravenously in small amounts—an action which may be concerned with the formation of edema, which is the accumulation of water in the tissues, as in dropsy. This action on the urine flow can be prevented if the animal is immunized to ferritin prior to its administration.

The Cornell scientists reported chemical studies of ferritin which are designed to provide a background for further study of the manner in which the substance is dealt with in the body.

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GEOLOGY

Is Crater Meteor-Made?

➤ A HOLE in Australia of tremendous proportions, estimated to be over half a mile wide, may prove to be a meteor crater second in size only to that in Arizona.

The rocky rim of the crater in places is a hundred feet or so above the level of the surrounding desert. On the inside the walls rise about 200 feet above the floor.

This "big hole" was found recently on the northeastern fringe of the Desert Basin. Its precise location is 64 miles south of the tiny hamlet of Halls Creek and some 400 miles inland from the coast, almost due east of Bromme.

There was no urge for any cattleman to climb what was seemingly a sterile stony ridge for no cattle would be there, Charles H. Holmes reports in WALKABOUT, the Australian Geographical Magazine. If cattlemen from leases on better country nearby knew of its existence, they apparently attached little importance to it. There is no record available to indicate that anyone ever reported its existence in earlier years.

Then in June of 1947 Dr. Frank Reeves, geologist, and N. B. Sauve, geophysicist, both of the Vacuum Oil Company, flew over the region. They were intrigued to see below them a huge, perfectly shaped crater.

The geologists wondered whether the crater was of volcanic origin or whether it had been caused by a meteorite. It resembled in contour the great crater near Canyon Diablo in the Arizona Desert. This crater is believed to have been formed by a gigantic fireball striking the earth, but although many meteorites have been found in the neighborhood, its central core has never been unearthed.

Dr. Reeves visited the crater by traveling overland with geologist H. J. Evans and Dudley Hart, who piloted the Zinc Corporation plane from which the crater had first been sighted. The trip to the rim was made largely by jeep, then completed on foot.

At first the scientists thought the crater was probably of volcanic origin, for it was hard to believe that a meteorite blast could tilt the strata so regularly. But it is situated on a flat plain, and there is no evidence of a volcanic cone. Also volcanic or igneous rocks are lacking, so the meteoric theory won out.

Although excellent pictures of the crater have been taken from the rim and the floor, a well-equipped scientific expedition to the region is needed to study its origin.

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MAY BE METEOR CRATER—This gigantic hole, estimated to be over half a mile wide, was photographed from an airplane flying low over the Desert Basin in northwestern Australia. It may prove to be a meteor crater, second in size only to that in Arizona.

A *railroad* at Salton, Calif., is nearly 200 feet below sea level.

Norway is building a number of hydroelectric plants underground.

"Loon Able" is not a bird; it is the Air Force's term to designate a 2000-mile air "tract" from the Aleutian Islands over the Pacific which planes fly regularly to report weather conditions for international use by weather forecasters.

AERONAUTICS

Wax Preparation Makes Plane Windshield Seem Dry

➤ A WET but seemingly dry windshield on an airplane in a storm is obtained with the use of a new wax preparation developed in Ottawa by the Canadian National Research Council. It is a safety preparation to decrease wet windshield obstruction to clear sight.

The wax preparation is called FC-10 Rain Repellent. When drops of water strike the treated windscreen they break down into tiny droplets which then pass off into the airstream. The droplets move so rapidly that they are quite invisible. The windshield therefore appears dry and allows vision free from distortion or ripples.

In actual tests, visibility of two miles has been obtained through the treated area under conditions in which untreated areas allowed no vision whatever, the Council reports. The treatment has proved satisfactory at all airspeeds, even in excess of 600 miles an hour. While it does not shed ice, the repellent permits normal de-icing, either with heat or alcohol, and still functions properly in shedding subsequent rain.

Optical errors caused by rain on the windshield of an airplane are usually greater than the pilot realizes. Simulated flight tests with a water spray on a sheet of glass in a high speed air current, showed that the extent of these errors varies considerably with the size of water drops, the amount of water, the air speed, and the angle of the windshield. Tests further revealed that the average error is up to five degrees in angle in the line of vision. This means that a mountain peak half a mile ahead of a plane flying in heavy rain might appear as much as 200 feet lower than it is in fact.

Credit for the new wax preparation is given to Dr. D. F. Stedman of the Council staff. It has been tested by the Royal Aircraft Establishment in England and commercial transports in Canada. It is now being manufactured and marketed by a Canadian firm.

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ENGINEERING

British Life Jacket Holds Man's Face Out of Water

➤ A LIFE JACKET which will hold the face of an overboard man upward and out of the water is under development by the British Navy. It is but one of several improved devices to increase the chances of survival of persons forced to abandon ship on the high seas.

The life jacket is designed to replace earlier types life belts and jackets in which many men have died because unable to breathe. The new jacket will automatically turn even an unconscious man face upward and support him high enough to keep mouth and nostrils clear of the water.

A life-float has been developed which is somewhat similar to the rubber aircraft dinghy developed by the Royal Air Force for pilots downed at sea. In comparison with the life-rafts now used by the British Navy, it is lighter and is equipped with a tent-like covering for protection against all types of weather. The equipment carried by it will include food, water, signal lights, fishing line, sea anchor, first aid kit and a radar reflector.

An exposure suit, for men going overboard in Arctic waters, protects them from the severe cold and also helps keep them afloat. It is so designed that it permits swimming. In tests already made, three young officers donned the suits, jumped overboard and swam to a life-raft.

Science News Letter, May 7, 1949

PHYSICS

Cosmic Rays May Affect Operation of Planes

➤ COSMIC RAYS which are continually bombarding us without doing any apparent harm, may be a hazard to the operation of electrical equipment on future high-flying airplanes, a military scientist warned.

Dr. Urner Liddel, chief of the physical science division of the Office of Naval Research, said that if airplanes operate at altitudes as high as 100,000 feet, cosmic ray particles "may conceivably have some effect on electrical equipment."

Dr. Liddel and Dr. H. V. Neher of the California Institute of Technology described cosmic ray research programs now under way as guests of Watson Davis, director of Science Service, on Adventures in Science, heard over the Columbia network.

A dozen teams of American researchers from different universities are now working on cosmic ray studies, Dr. Liddel reported. These studies are being supported by the Office of Naval Research and the Atomic Energy Commission.

Big problem of measuring the cosmic radiation is the fact that it varies both at different locations on the earth and at different altitudes above the earth, the scientists explained.

Because of this, cosmic ray scientists climb mountains, carry their ray counting instruments in airplanes and send the instruments aloft in balloons and rockets.

Goal of this extensive research is more knowledge of the atom, and of powerful cosmic ray particles of much higher energy than can be produced in any man-made atom smashers. Top energy for a proposed atom smasher is 6,000,000,000 electron volts. Cosmic ray particles have been found with energies of 1,000,000,000,000,000 (a million billion) electron volts.

"Our studies play an important role in our acquisition of new knowledge of the atom and our campaign to learn more about the peacetime applications of nuclear energy," declared Dr. Liddel.

Science News Letter, May 7, 1949

IN SCIEN

TYPOGRAPHY

Design No-Contact Printing With Electrical Charges

➤ A REVOLUTIONARY system of printing in which no contact or pressure is used in transferring the ink to the paper has been demonstrated.

The process developed by W. C. Huebner of Huebner Laboratories, New York City, uses positive and negative electrical forces for printing, with the paper and inked image separated by perhaps a thousandth of an inch.

This printing system is called Onset by its inventor and uses what is called an electronographic press. It can be used with any of 32 different printing processes, printing one or both sides of the paper in one to six colors, Mr. Huebner reported.

Because no pressure is used in the printing process, it is suggested that less expensive paper can be used in printing with the Onset system. Smoother printing with better plates yielding finer illustrations and texts are claimed for the new process.

Science News Letter, May 7, 1949

ENGINEERING

Ultramatic Drive for Autos Eliminates Gear-Shifting

➤ DETAILS of the new "ultramatic drive," which will be optional equipment on cars, were revealed by the Packard Motor Car Company in Detroit, which is now celebrating its golden anniversary. One engineer pronounced it the closest approach to the engineering ideal of no transmission at all.

This "no-shift" device is said to be unlike any other in the automobile industry. It is unique in that it utilizes a torque converter for acceleration and positive mechanical drive for cruising. When a driver presses hard on the accelerator, the unit does not automatically shift into positive drive, the direct connection between engine and rear wheels, until 55 miles an hour. If he releases pressure momentarily at any point point between 15 and 55 miles an hour, the unit shifts at once into direct drive.

Direct drive means no wasteful slippage because the torque drive "goes along for the ride" while the engine directly powers the rear wheels, a company engineer stated. The Packard torque drive is simpler than any other now being produced, he said, and contains fewer parts. The ultramatic drive he claimed to be simple, smooth, thrifty and quiet, yet more responsive, more positive and more flexible than any other automatic transmission yet produced.

Science News Letter, May 7, 1949

E FIELDS

METEOROLOGY

Heated Rocks May Give Better Radioactivity Test

➤ ENERGY from exploding atoms accumulated over millions of years can be stored in the earth's rocks and released usefully in a rush through a phenomenon explained to the National Academy of Sciences in Washington.

Thermoluminescence, which is a giving off of light when material is warmed up, may also give a more sensitive test for radioactivity than a Geiger counter, Dr. Farrington Daniels of the University of Wisconsin explained in a paper prepared jointly with Drs. Charles A. Boyd and Donald F. Saunders.

Many rocks and minerals exhibit this property due to radioactivity through the ages caused by traces of the atomic energy elements, uranium and thorium. Dr. Daniels suggested that it might be possible to detect these elements through this method even when they were present in less than one part in a million.

During the war radar images were stored on fluorescent mineral screens and made to appear when desired by heating them up by infrared "black" light.

Rhythms of heating deep in the earth's crust could be caused by trapped and stored radioactivity being released quickly by heat. This promises to give geologists a new way in which some rocks of the earth could be formed.

Science News Letter, May 7, 1949

GENETICS

Effects of Radiation on Offspring Called Insidious

➤ ATOMIC warfare in this generation would not necessarily be productive of cripples, blind children and other hereditary defectives in future generations, declared Prof. H. J. Muller, Nobel prizewinner now on the faculty of Indiana University.

Effects would probably be much more insidious, and correspondingly more difficult to recognize and analyze. They might take the form of intense nervousness, abnormal vitamin requirement, or a tendency to develop such diseases as rheumatism, he stated. In the end, the affected human stocks would tend to die off through failure to reproduce.

Prof. Muller was a guest of Watson Davis, director of Science Service, on Adventures in Science heard over the Columbia network.

Based on the number of defective genes originating in easily observed laboratory animals, such as fruit-flies, Prof. Muller prophesied that after a genetically effective dose of radiation such as might be produced by an atom-bomb, "among all the descendants of 20,000 parents so exposed, about 1,000 would in the end be killed genetically, and, along the way, several thousand, though not killed, would have been more or less hampered."

He pointed out also that such a dose of rays from an atom bomb would reach, not 20,000, but probably several hundred thousand people if the bomb were exploded over a large city.

Not only that, but X-rays and similar radiations now used for medical effect, sometimes directly on the reproductive organs themselves, are often well in excess of the quantity required to produce these undesirable hereditary consequences.

Among persons other than doctors' patients who are exposed to possibly genetically harmful doses of X-rays Prof. Muller mentioned X-ray operators, industrial workers, shoe salesmen and their customers, and some scientists. In the government's atomic radiation laboratories and other installations, he added, great care is used to keep exposure well below the danger point.

Science News Letter, May 7, 1949

GENERAL SCIENCE

Americans and Canadian Honored by Academy

➤ A CANADIAN scientist and three Americans were honored by the National Academy of Sciences at its annual dinner in Washington.

Dr. Frank McLearn of the Geological Survey of Canada was awarded the 1948 Mary Clark Thompson gold medal and honorarium. A. L. Wright, senior scientific officer of the Canadian Embassy, accepted the award on behalf of Dr. McLearn who was unable to be present. The medal was conferred in recognition of Dr. McLearn's contributions to geology and "to an important scientific organization in a friendly neighboring country."

Scientific achievements ranging from pioneering work in the study of the upper atmosphere and in fields of nuclear physics to the development of the proximity fuse were cited in the presentation of the Cyrus B. Comstock Prize for 1948 to Dr. Merle A. Tuve, director of the department of terrestrial magnetism of the Carnegie Institution of Washington. The prize is $3,500.

The Academy's public welfare medal for 1948 was awarded to Dr. George H. Shull, emeritus professor of botany and genetics at Princeton University, for his work as an originator of hybrid corn.

Prof. S. A. Mitchell, for more than 30 years director of the Leander McCormick Observatory of the University of Virginia, was presented the James Craig Watson gold medal and honorarium for distinguished services to astronomy.

Science News Letter, May 7, 1949

MEDICINE

Humans May Benefit from Diet Cure of Rat Drunks

➤ SOME rats, given a chance, become alcoholics, just like humans. Others remain total abstainers. In some of the rat drunks there is a hereditary factor. They can be cured by suitable diet. "Shotgun" diet treatment of human alcoholics, therefore, could be expected to cure them of their craving for drink.

This, in brief, is what Prof. Roger J. Williams of the University of Texas told members of the National Academy of Sciences meeting in Washington.

The rat studies, by himself and his associates, L. Joe Berry and Ernest Beerstecher, were carried out to obtain evidence for a theory which Prof. Williams believes accounts for alcoholism, mental diseases, heart and blood vessel disorders, allergies, arthritis, multiple sclerosis "and even cancer."

The theory is that some people are born with a disturbance of body chemistry conducive to the development of "crucial deficiencies." As a result, even when eating a diet adequate according to nutritional standards, they are not getting enough of certain nourishing elements for their particular needs. And as a result of this deficiency, various diseases may develop.

Prof. Williams calls his theory a "concept of genetotrophic disease."

"Geneto," he explains, refers to genetics, and "trophic" refers to nutrition.

"A genetotrophic disease (of which we believe alcoholism is an example) is," he stated, "one arising from nutritional deficiency which in turn has its basis in a genetically controlled augmented requirement for one or more specific nutritional elements."

Science News Letter, May 7, 1949

METEOROLOGY

Man-Made Weather Used In Testing Equipment

➤ MAN-MADE tropical weather, as well as polar weather, is now available at the Army Signal Corps base in Fort Monmouth, N. J., to test instruments, equipment and clothing for use in extreme climatic conditions. The new tropical chamber simulates humid jungle and can sustain a maximum temperature of 190 degrees Fahrenheit and 100% humidity.

Because of the tropical room's proximity to the Signal Corps arctic chamber, where man-made snowfalls can be produced in a matter of minutes, it is now possible to subject materials to both extremes of temperatures with minimum time. Together they will help the Signal Corps develop and test the performance of signal equipment under conditions that might be encountered anywhere in the world.

Science News Letter, May 7, 1949

MATHEMATICS

Geometry Is Made a Game

Flexible geometric models illustrate theorems which make it easy to learn the laws of triangles. The idea was born about a year ago.

By MARTHA G. MORROW

➤ GEOMETRY a tough subject?

Not if you make models out of elastic from a lady's old hat, two pencil stubs, a screw eye, a nail and several pieces of cardboard.

In a few minutes anyone can build demonstrations that will "Q. E. D." to any teacher's delight.

Some of the country's leading mathematicians are working together to turn geometry into an exciting game. More than 10,000 kits are being distributed in cooperation with the National Council of Teachers of Mathematics.

The flexible models can be put together in a matter of minutes. Dark elastic represents two sides of the triangle and a printed line forms its base. By looping the elastic over a small nail stuck at various points in a piece of cardboard, a wide variety of triangles can be made.

If you have already mastered plane geometry, these will help refresh your memory. If geometry is still something you will study in the future, these flexible diagrams will help you understand some of the fundamentals. And in any case, they are fun to play with.

Model Proves Theorem

Remember the old theorem saying that triangles may be long and thin, or fat and squatty, but if their bases and altitudes are equal, they will have the same area. One of the models lets you see that this is true.

Did you ever question that a line connecting the mid-point of two sides of a triangle would be parallel to its base?. If so, one of the flexible models was made specially for you. And if, after forming various triangles merely by rotating a black pencil, you are still an "unbeliever," you can take out a ruler and actually measure the distance between the two lines.

The idea of making a game of geometry was born about a year ago. Its parents (and it has more than two!) are all geometry teachers. Dr. E. H. C. Hildebrandt loves to amuse his friends with collapsible figures demonstrating various phases of geometry. Prof. M. H. Ahrendt of Anderson College is an old hand at devising ingenious ways of making mathematics a vivid, living subject. These two thought up the idea of putting into a kit the few simple materials needed to make a series of models.

But the feminine touch was lacking until Miss Frances M. Burns of Oneida (N. Y.) High School was called on to design several models. Just like a woman, she used scraps to produce a tricky set of flexible diagrams.

Science Service, an old hand at assembling actual specimens and working up experiments to be done with them, was persuaded to issue a trial set of these kits.

A half dozen kits made their debut at the recent annual convention of the National Council of Teachers of Mathematics in Baltimore. They were immediately recognized as a tailor-made aid to visual education. The idea caught like wildfire, and the committee drew heavily on its backlog of units to supply geometry teachers with a means of getting and keeping the interest of the entire class.

You can easily make one or two of these models yourself. The few materials you need undoubtedly will be found around the house. When you have completed it a "geometry party" might be in order to show off your masterpiece.

Two parallel lines are the basis of the model designed to show how triangles of equal area may vary greatly in shape. First cut a rectangle three inches wide and five inches long from a piece of stiff cardboard, preferably of a pastel shade.

About half an inch from the bottom of the long side draw a line the entire length of the card. Make it red or some other color that contrasts nicely with the cardboard. About two inches above this and parallel to it, draw another line.

On the lower line, fairly far to the left, mark a point "A." On the same line, about two inches to the right of "A", mark a point "B." Connect with a dotted black line. Select a point "C" near the center of the top line and in red draw lines to A and B. This completes the triangle ABC.

Permanent Model

To make a really permanent model, back the cardboard with heavy corrugated board, or with very stiff cardboard cut from a packing box. Cut to exactly the same size as the colored cardboard and tape the two together.

With a pin at A and B punch holes through both the cardboard and the corrugated board. Thread a seven-inch piece of dark round elastic through these holes, leaving a generous loop about four and a quarter inches long on the front side of the model. Knot well on the reverse side so the elastic will not pull out. Your model is now complete.

Loop your elastic around a small nail and

PUZZLING FIGURES—Geometry can be a difficult subject to grasp in the pages of a textbook.

VISUALIZING THEOREMS—Geometry can now be fun, thanks to simple but interesting new kits which have been prepared to let you actually see the problems of triangles.

stick the nail somewhere on the top line, well to the right of C. Does the three-sided figure, made by the elastic and the dotted line AB, seem to have about the same area as triangle ABC?

Try sticking the pin at other points along the upper of the two parallel lines, which is a cute way of being sure that all the triangles have the same altitude. Notice that when the pin is placed far to the right, the triangle is quite elongated; when it is placed near C, it becomes short and fat. In all cases, however, the triangle is equal to ABC in area.

Only one line need be printed on the model that might well be called: "Midpoints of Sides." From your colored cardboard cut a rectangle three by five inches. In the lower left-hand corner start a straight line segment that slopes inward and extends almost to the top of the cardboard rectangle. Mark the upper end-point of the line segment "A," the lower end-point "B," and the exact middle of the line segment "M." Back the rectangle with corrugated board .

To prepare the other leg of the triangle, split in half the stub remainder of a used pencil. A stub about three inches long would be best. This will be easier to do if you slip off the cap holding the eraser, scrape off the paint along the edges where the two halves of wood are glued together and soak in water. Remove the center lead, and paint the wood black.

About a quarter inch from each end of the wood bore holes large enough to take the elastic. To avoid splitting the wood, start the hole with a small nail and complete with a tiny screw. Now bore a third hole midway between these two.

At B and M punch small holes. Thread a piece of elastic five inches long through B and through the hole at the lower end of the wooden stick, and knot.

Thread another piece of elastic three and a half to four inches long through M and through the hole at the midpoint of the stick, pushing it into the wood from the same side as the longer elastic and knot both ends.

Stick a carpet nail through the third hole, and punch it through the cardboard and corrugated board at A. With a pair of pliers bend the end of the nail so it does not pull loose. Rotate the wooden piece to be sure it pivots easily around the nail.

One piece of elastic now forms the base of the triangle and the other connects the midpoints of the other two sides. As you rotate the stick, the elastic lines get closer and closer together, but always remain parallel.

Some geometry kits have been reserved for readers by Science Service.

The four models, all dealing with triangles, may be easily assembled from the materials included. A leaflet suggests a wide variety of experiments to be performed with them, and gives full details for making large demonstration models.

To get one of the kits, send 50 cents to Science Service, 1719 N Street N. W., Washington 6, D. C. Just ask for Geometric Models Kit.

Science News Letter, May 7, 1949

PALEOBOTANY

No Eden-Like Climate

➤ PICTURES of an earlier, Eden-like earth with a warm, balmy climate evenly distributed all over it and palm trees waving in the Arctic, were declared all wrong at the meeting of the National Academy of Sciences in Washington, by Prof. Ralph W. Chaney of the University of California.

Fifty or sixty million years ago, in the time geologists call early Tertiary, the climate of the whole earth was warmer than it is now, Prof. Chaney stated; but there was marked zonation just the same. Plant fossils collected in the Far North show that it had a temperate climate like that of the central and northern United States, while in what is now the Pacific Northwest conditions were subtropical.

In between these two great vegetational regions there was an intermediate zone. In this there were trees and shrubs representative of the regions on either side, but the dominant tree was the "dawn redwood" or Metasequoia, living representatives of which have recently been found surviving in China. Interestingly enough, the present Chinese Metasequoias also occupy an intermediate position, with cool-temperate trees to the north and warm-climate forests to the south.

The land bridge between North and South America now known as the Isthmus of Panama has been carrying two-way traffic for the past 5,000,000 years, Dr. W. P. Woodring of the U. S. Geological Survey told the Academy. The traffic at first was unevenly divided, with more animal migrants going south than there were going north, he added.

Fossil records show that the very first users of the bridge in both directions were small animals; and Dr. Woodring suggested that these did not even wait for the bridge to be completed, but made their way from island to island, "using still-separated spans and completed piers as stepping stones."

Science News Letter, May 7, 1949

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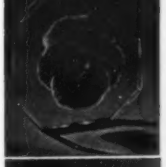

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ORDNANCE

Russian Weapons Good

➤ THE Red Army's weapons often look rough and unfinished, even crude, but they should never be underestimated on that account, warns Capt. B. H. Liddell Hart, well-known English military analyst, in the technical journal, ORDNANCE (May-June). The Germans made that error—and had to unlearn it the hard way.

When the Nazi forces attacked Russia in 1941 they soon discovered that the rifles and machine guns in the hands of their Soviet opponents were more modern than their own, with better fire rates.

The Russian mortars, states Capt. Hart, "were so simple in construction and roughly finished that they looked like the product of a village blacksmith, yet they were most efficient. Their apparent crudeness was far outweighed by the advantage of rapid output."

The Red Army's great weapon-superiority over the German foe, however, lay in their tanks, declares the English writer. This was not true at the outset, for the Russians were caught in a transition period between an obsolescent model which they possessed in numbers and a newer type not yet in mass production. So in the initial campaign the Nazis "cleaned up" on the Russians.

However, by the time the second phase of the war set in, the newer tanks were ready, and after that the advantage remained with the Soviet forces. The newer Russian tanks were low-built, presenting more difficult targets. They had wide treads, enabling them to maneuver on soft ground, particularly in spring, when the sandy soil of the Russian plain became a miry mud that bogged down the ponderous German "Tiger" tanks. These newer tanks were modifications of an American model, the Christie tank, which the inventor sold to the USSR after he had been repeatedly turned down by U. S. Army authorities, Capt. Hart adds.

Like much of the rest of the Russian equipment, their tanks had a rough and unfinished appearance. They were not even painted. They were cramped and uncomfortable inside, exceedingly tiring to any crews less tough than the Red soldiers, and they were lacking in most of the radio and optical aids considered essential by Western tank commanders. But they had good guns, they could be depended on to keep going, and they could be produced rapidly in the hard-pressed Soviet factories. Most important of all, they could fight.

Science News Letter, May 7, 1949

RADIO

Ease License Process for Two-Way Radio System

➤ IT WILL be easy to get a government license to operate a short-range radio station after June 1, the Federal Communications Commission revealed. The license is the type needed to operate a so-called Citizen Radio Station, for two-way communication with nearby points such as from a rancher's home to an outlying cattle-feeding barn.

The application will be sent on a single card form, which will be available soon at the Commission's field offices and the Washington office. Applicants must be at least 18 years old. Their equipment must be approved as to type and must operate in the 460-470 megacycle band previously allocated to this service. Two types of stations may be authorized, including input power of 10 watts for one and 50 watts for the other.

The Citizens Radio Service is designed primarily to afford a two-way short-range private communication service between fixed or mobile stations. The possible uses are many and varied. The service may be used for communication on farms, from headquarters to field crews on construction projects, and from a factory office to outlying buildings. It may be used also to communicate with moving vehicles within a limited range.

The Commission has established a procedure for approving equipment to be used in this service. Transmitters or transmitter-receivers tested and found by the commission to conform to certain technical standards will receive a certificate of type approval. One transceiver has already been approved and it is expected others will be later.

Science News Letter, May 7, 1949

MEDICINE

New Center To Supply Blood for 168 Hospitals

➤ TO SUPPLY 168 hospitals with human blood needed for the sick, the 23rd regional blood center and the largest of the American Red Cross blood units has begun operation in Philadelphia. With the cooperation of 15 Red Cross chapters in Pennsylvania and New Jersey, this latest center has the job of collecting 155,000 pints of blood a year.

Science News Letter, May 7, 1949

Words in Science—DOLORIMETRY

➤ A NEW method for measuring pain by comparing the spontaneous pain of disease or childbirth with that induced by a measured amount of heat rays shining on the forehead is called dolorimetry. It is pronounced dole-o-rim-e-try, with the stress on dole and rim.

Units of pain in the new scale are called dols. Top of the scale is the point where a further increase in the intensity of the heat rays fails to add any to the pain felt. This is given a rating of 10 dols. Bottom of the scale, one dol, corresponds with the amount of heat which produces a just barely perceptible prick.

Science News Letter, May 7, 1949

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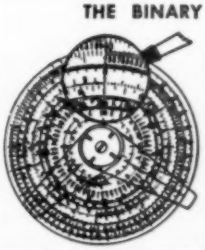

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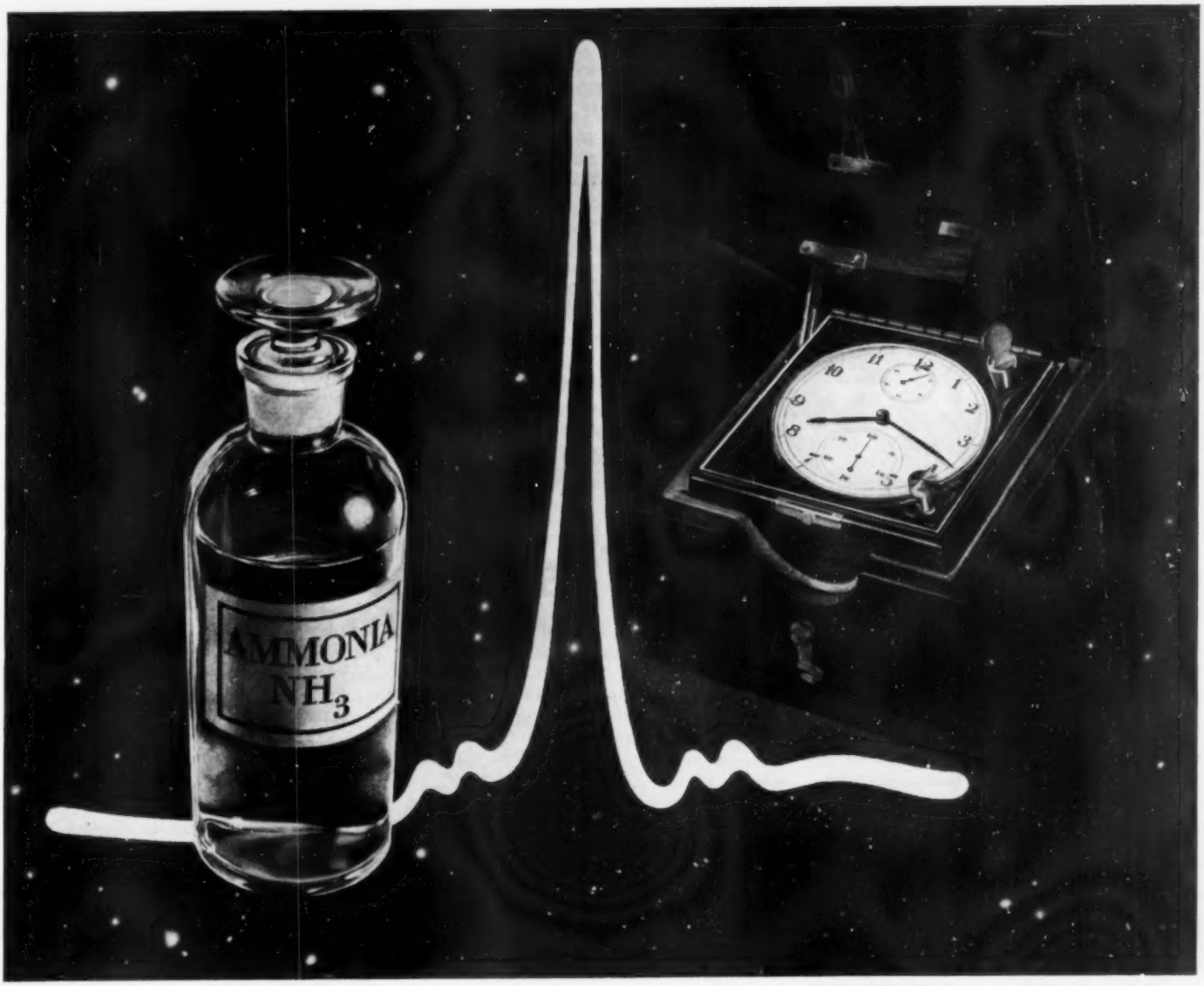

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Such a timepiece – constructed by the National Bureau of Standards on a principle conceived and demonstrated at RCA Laboratories – is now in operation. More accurate than the stars? Yes, because "star time" will vary when Mother Earth wobbles in her orbit.

The pendulum of RCA's clock is an atom . . . at present, the nitrogen atom in an ammonia molecule . . . though others may later be used. Vibrating at 23 billion 870 million times a second, it controls a system of radio waves and electrical impulses which operates the clock–locks them in tune with its own unvarying beat!

You will hardly want an "atomic clock" to get to the office promptly, or get your children to school. But scientists and engineers who must split seconds into millions of parts need this more accurate way of *telling time.*

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Woodland and Desert

➤ PEOPLE from the East, spending their first spring season in the Southwest, are apt to exclaim in wonder over the similarity between the spring flower populations of the woodlands they have known and the desert they are visiting. After the winter rains cease and the land begins to warm up, there is a brief flaming of delicate floral beauty among the gnarled stems of the chaparral and the spiny clumps of cactus.

The similarity between the spring floras of Eastern woodland and Western desert is the more striking in that even the non-botanist can recognize many old familiar friends; violets and buttercups, blue-eyed grasses and ground orchids, pentstemons and shooting-stars. They are identical genera, sometimes even the same species as the ones "back home." Even where the forms are a bit strange, the general type fits into the picture; the flowers and leaves are thin and delicate of texture, as one expects spring flowers to be. Soon—in a few weeks at most—the glory departs, and by the time dry summer sets in there is no more trace of the spring flora than there is in the summer woods of the East.

This strange-seeming meeting of East and West in spring is not without cause. There is more similarity between woodland and desert than we are likely to recognize without a careful ecological look at the matter. For the moment, the desert is not a desert: there is adequate moisture in the soil to support the delicate temporary plant community that springs up among the harsh-leaved, tough permanent desert vegetation. Similarly, for the moment the Eastern woodland is not the "humid" region it is commonly declared to be in the school books: before the leaves on the trees develop to full size and form a closed canopy, evaporation rates in the woods are quite high. Thus for a short time environmental conditions in woodland and desert come close to each other, with the soil supplying plenty of water and the air removing it rapidly, and with plenty of sunlight reaching the small plants beneath both trees and chaparral. Since the two environments are temporarily somewhat similar, it is not remarkable that the plants themselves show a considerable similarity.

Science News Letter, May 7, 1949

CHEMISTRY

Oil Wastes in Streams

➤ STREAM pollution from oil refineries has greatly decreased in the past decade due to activities on the part of the industry to obtain complete use of chemicals formerly wasted, and the pressure of federal and state laws designed to keep the water of the streams pure for human and wildlife protection.

Twenty-five years ago the prevention of stream pollution, to most refiners, meant preventing objectionable amounts of oil from leaving their plants with the waste water, the American Petroleum Institute was told in Houston, Texas, by L. C. Burroughs and R. W. Carnahan of the Shell Oil Company. By-product and spent chemicals are now important polluters.

Chemical pollution became greater with the expansion of the oil industry and the development of new products and new processes which necessitate the use of additional chemicals in large quantities. Greatly increased volumes of sour crude oils are being processed and these require comparatively heavy chemical treatment.

The scientists discussed the effects of pollutants on surface waters, and described procedures and equipment used successfully for disposing of refining chemicals. These include caustic soda, sulfuric-acid sludges, phenolic wastes, hydrogen sulfide, spent catalysts, mercaptans and sulfide-bearing waters.

Three chemists of the Socony-Vacuum Oil Company, of the Augusta, Kans., division, F. M. Faulconer, D. L. McCann and H. L. Bedell, presented a method of partial conditioning of petroleum-refinery effluent for re-use and disposal as applied in the operation of a skimming and cracking plant.

The process involves collection, cold process-water treating and filtering, plus other treatment to remove all evidence of oil and most of the other contaminants. The result is water with little odor which contributes no deleterious effects to the local surface-drainage streams.

A new oil separator for refinery wastewater disposal was described by G. E. King of the Standard Oil Company, Cleveland, Ohio. It includes a distribution chamber and 20 final chambers. Between are submerged sluice gates and full-width weirs. The separator is equipped to collect, transfer and settle separated oil and sediment.

Science News Letter, May 7, 1949

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BUILDING YOUR MARRIAGE—Evelyn Millis Duvall—*Public Affairs Commitee*, 31 p., illus., 20 cents. Helpful advice to young couples prepared cooperatively with the National Conference on Family Relations.

CULTURE AND ETHOS OF KASKA SOCIETY—John J. Honigmann—*Yale University Press*, 365 p., illus., paper, $4.00. Report of research and field trips.

DYNAMICS OF VEGETATION—Frederic E. Clements—*Wilson*, 296 p., illus., $3.75. A compilation of selected writings about plant succession as related to human problems, plant competition, and how to read the messages that vegetation presents, revealing soil conditions, climate and land use or misuse.

FARM WORK SIMPLIFICATION—Lawrence M. Vaughan and Lowell S. Hardin—*Wiley*, 145 p., illus., $2.80. Telling the farmer how to save steps and reduce the work of his daily chores. An interesting application of time and motion study to farm work.

GEOLOGY— H. H. Read—*Oxford*, 248 p., illus., $2.00. Methods by which the record is read are explained and a summary of the earth's history is given. Of British origin.

THE GREAT PICTURES 1949— Clifton C. Edom, Ed.—*Greenberg*, 128 p., illus., $3.50. The finest examples of pictorial journalism in the sixth annual "News Pictures of the Year."

GODS AND MEN—Sir Richard Gregory—*Stuart and Richards*, 214 p., illus., (approx. $3.00). A renowned scientist tells how he believes contemplation of the heavenly objects and the invisible forces controlling them has affected man's religious and philosophical thinking.

HOW TO KNOW THE IMMATURE INSECTS—H. F. Chu—*Brown*, 234 p., illus., paper, $2.00 Insects spend more time in their immature stages than they do as adults. Identification of the larvae—maggots, worms and caterpillars—is important to the control of their destruction of crops.

HOW TO MAKE A SHIP IN A BOTTLE—Clive Monk—*Studio*, 64 p., illus., $1.50. Detailed instruction on this inexpensive hobby, which takes skill but is not exactly a science.

HOW TO MAKE A SPEECH AND LIKE IT—Lawrence H. Mouat—*Pacific Books*, 94 p., illus., $2.00. Basic principles of speech making. Amusingly illustrated.

MODERN WONDERS AND HOW THEY WORK—Captain Burr W. Leyson—*Dutton*, 216 p., illus., $3.50. Explanations for the layman of modern wonders such as atomic fission, robot planes, and radar.

THE OCEAN—F. D. Ommanney—*Oxford*, 238 p., illus., $2.00. A book of British origin about the sea and what it contains and also the life on the seashore.

PHOTOELECTRICITY AND ITS APPLICATION— V. K. Zworykin and E. G. Ramberg—*Wiley*, 494 p., illus., $7.50. This volume, which replaces the authors' second edition of *Photocells and Their Application*, deals with the principles and preparation of photosensitive devices and their application.

THE STORY OF OUR TIME 1949—E. V. McLoughlin, Ed.-in-Chief—*Grolier Society and Richards*, 432 p., illus., $10.00. An encyclopedia yearbook providing a review of the year's developments as seen through the eyes of more than 100 authorities. The science review and preview sections are by Watson Davis, director of Science Service.

WOODEN DOLLARS—Henry I. Baldwin—*Federal Reserve Bank of Boston*, 127 p., illus., paper, $1.50. A report on the forest resources of New England, their condition, economic significance and potentialities.

WOODY PLANTS OF THE WESTERN NATIONAL PARKS—Virginia Long Bailey and Harold Edwards Bailey—*University of Notre Dame Press*, American Midland Naturalist Monograph No. 4, 274 p., illus., $4.00. A guide to the plants of sixteen national parks.

YOU CAN FIND URANIUM—Joseph L. Weiss and William R. Orlandi—*Weiland*, 128 p., illus., paper, $2.00. A pocket guide to uranium prospecting.

Science News Letter, May 7, 1949

SCIENCE FILMSTRIPS

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EVOLUTION

Plants' Natural Selection A Long-Time Process

➤ PLANTS evolving by sudden changes of genes, or mutations, do not necessarily show the effects at once, and the process of natural selection, supposed to nip off such unpromising variants immediately, may require 50 or more generations, Prof. G. Ledyard Stebbins, Jr., of the University of California, stated at the meeting of the American Philosophical Society in Philadelphia.

"Furthermore, the units selected are not mutations with conspicuous effects," he continued, "but genes which by themselves have relatively little effect on the phenotype (immediate appearance of offspring), and act together to produce the phenomenon of multiple factor inheritance."

By controlling conditions of competition among experimental plants, Prof. Stebbins stated, it has been possible to produce situations closely simulating those supposed to take place as evolution proceeds in nature.

Science News Letter, May 7, 1949

Science Service Radio

➤ LISTEN in to a discussion on "Keeping America First in the Air" on "Adventures in Science" over the Columbia Broadcasting System at 3:15 p. m. EDST, Saturday, May 14. John Francis Victory, secretary of the National Advisory Committee for Aeronautics, will be the guest of Watson Davis, director of Science Service. The research laboratories of the committee have repeatedly created revolutions in aeronautics and are largely responsible for American aviation supremacy. Mr. Victory, long a leader in this governmental organization, will tell of the latest progress. His report is timely because inspection of Langley Field laboratories will be held at this time.

Science News Letter, May 7, 1949

New Instrument Increases Reading Speed 30% to 300%

The TDC Reading Rate controller, an improved general training and remedial reading device, is now available for training children and adults to read faster and more intelligently. It increases reading rates, improves reading habits and develops flexibility of reading rates for varying purposes. The Reading Rate Controller has effected improvements in speed ranging from 30% to 300%. It is now being used by Cornell University, the University of Chicago, the National War College and many other institutions.

For a 4 page bulletin giving complete details, case histories and a list of prominent users, write Three Dimension Co., 4557 W. Addison St., Chicago 41, Illinois.

• New Machines and Gadgets •

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C. and ask for Gadget Bulletin 464. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

SAFETY RECEPTACLES, for use as electric outlets in the home, are safe for children because the current flows only when standard or polarized caps are inserted. It has four insulated rollers within, two of which must be engaged at the same time to energize the unit.

Science News Letter, May 7, 1949

PARACHUTE TESTER, for the U. S. Air Force, whirls a parachute around a 120-foot tower at speeds up to 500 miles an hour. Folded parachutes will be placed in a bomb-shaped container attached to a revolving boom at the top of the tower, and discharged into the air at the proper time by a special device.

Science News Letter, May 7, 1949

LADDER HOOK for painters and window washers is a cast aluminum device which fits over a ladder rung and around both edges of the ladder side, providing double hooks to hold the pail. The bucket is held out of the user's way on the outside of the ladder and can not sway because of the two hooks.

Science News Letter, May 7, 1949

MAGIC HANDLE on a vacuum cleaner carries within finger-tip all operating controls, as shown in the picture. Under it is a remote-control lever which releases the

entire cleaner handle to any desired position, and on the top are a two-speed switch and a button which automatically reels in the cord.

Science News Letter, May 7, 1949

DRY-ICE REFRIGERATOR, recently patented, uses both this solid carbon dioxide and water ice, so disposed as to cooperate for efficient and long-lasting cooling effect. It provides isolated users, far from electric lines, with natural ice. There are no drippings from the refrigerator because the melted water ice is refrozen for re-use.

Science News Letter, May 7, 1949

COOKIE CUTTER turns out cookies that look like the top of a birthday cake, with irregular scalloping suggesting home-made icing, and the words "Happy Birthday" on their tops. The cutters are made of colored or transparent plastic.

Science News Letter, May 7, 1949

SHOWER BATH-BRUSH, with nylon bristles twisted into wire to form a curved oval surface, has a thin plastic tube set in the middle of the bristles from which water is sprayed on them and the body. A five-foot non-kinking white rubber tube connects the brush to the faucet.

Science News Letter, May 7, 1949

RIPPER that fits into the needle bar of any sewing machine is claimed to take out seams as fast as an ordinary needle puts them in. The device is a tiny honed and angled knife-like instrument that separates the weave in fabric without cutting the cloth but slices the taut bobbin stitch.

Science News Letter, May 7, 1949

Do You Know?

The majority of paved airports in the United States are of *asphalt.*

Large *sugar maples* may yield from 30 to 40 gallons of sap in a single season, enough to make some three quarts of maple syrup.

Invasions by *mice,* which resulted in the destruction of crops and brought epidemics of disease, are referred to in Greek and Roman classical writings.

In atomic energy plants, radiation warning instruments have nicknames such as Cutie-Pie, Pluto, Poppy, Fish-Pole and Walkie-Squawkie; essentially, they are forms of the *Geiger counter,* the instrument used to detect radioactivity.

Postwar university and college enrolment is indicated by the number of *degrees awarded* by American institutions during the year ended June 30, 1948; including bachelor's, master's and doctor's degrees, they totaled over 318,000.

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